DOCUMENT RESUME

ED 463 934 RC 023 491

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TITLE	Fishing, Boating and Aquatic Stewardship Education: Framework and Best Practices Recommendations.
PUB DATE	2001-07-31
NOTE	15p.; In: Defining Best Practices in Boating, Fishing, and Stewardship Education; see RC 023 490.
AVAILABLE FROM	For full text: http://www.rbff.org/educational/BPE1.pdf.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Educational Practices; *Educational Principles; Educational Research; *Environmental Education; *Outdoor Education; *Professional Development; *Program Development; Program Effectiveness; Program Evaluation; Workshops
IDENTIFIERS	Boating; Fishing; Stewardship; Task Force Approach

ABSTRACT

Increasing questions about the value and efficacy of aquatic and boating education programs have led to demands for scientifically based guidance for improving and evaluating those programs. The Recreational Boating and Fishing Foundation commissioned 11 aquatic, environmental, and outdoor education professionals to provide summaries of research and recommendations for the development of best professional practices for fishing, boating, and stewardship education. The research and recommendations were then reviewed by 25 researchers and educators during a workshop. This paper summarizes the process involved in completing this project, develops the conceptual framework within which to consider the principles and recommendations, outlines the recommendations, and provides an overview of the background papers. The conceptual model for program development and evaluation includes inputs (resources), activities, participants, outputs (numbers and feedback), and outcomes. Outcomes include short-term (learning and attitudes), medium-term (behaviors), and long-term (effects on conditions). Five tables list guiding principles for boating, fishing, and aquatic education, and best practices for program development and implementation, professional development, program evaluation, and research. (Contains 15 references.) (SV)

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Fishing, Boating and Aquatic Stewardship Education: Framework and Best Practices Recommendations

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Abstract – Increasing questions about value and efficacy of aquatic and boating education programs have spurred the call for scientifically based guidance for improving and evaluating those programs. The recreational Boating and Fishing Foundation has responded to this call with the *Best Practices in Boating, Fishing and Stewardship Education Project*. A group of eleven aquatic, environmental and outdoor education professionals were commissioned to provide summaries of research and recommendations for the development of best professional practices for fishing, boating and aquatic stewardship education. Twenty-five researchers and educators then reviewed the research and recommendations during a workshop. They compiled, and agreed upon, guiding principles and specific best practice recommendations for planning, designing, implementing, and evaluating aquatic and stewardship education programs. Additionally, the workshop group made recommendations for improving aquatic education research. This paper summarizes the process involved in completing the project, develops the conceptual framework within which to consider the principles and recommendations, outlines the principles and best practice recommendations, and provides an overview of each background paper written by experts in aquatic, environmental, and outdoor education related fields.

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Project Background

In 1998, the Department of Interior's Sport Fishing and Boating Partnership Advisory Council completed a strategic plan for their Outreach and Communication Program. The initiative sought to increase participation in fishing and boating to complement ongoing conservation efforts by government agencies, and to pass on these American traditions and a legacy of stewardship. The Recreational Boating and Fishing Foundation (RBFF), whose mission is to increase participation in recreational angling and boating and thereby increase public awareness and appreciation of the need for protecting, conserving and restoring this nation's aquatic natural resources, was created to carry out this initiative.

RBFF's directive provides the impetus for delving into the aquatic education arena. A primary thrust of the RBFF is to advance an agenda of enabling outdoor educators to access guidelines for best practices in delivering fishing, boating, and stewardship education programs. Accomplishing this mission in a way that ensures that fishing and boating is done in a safe, responsible, inclusive and sustainable way—and driven by an environmental ethic that places the interests of the resource and the best traditions of boating and fishing above mere personal gain, self-gratification and individual need—requires strong educational support, and a grounding in research-based best practices. The objective is to develop and sustain the type of boating and fishing that keeps the long-term view in mind, perpetuates the resource and the tradition, and bequeaths both healthy aquatic resources and a vibrant outdoors legacy to future generations.

Task Force Two – The Education Task Force

Widespread recognition of the absence of formal evaluations and related research to guide aquatic resource and aquatic educators manifested itself as a priority concern at the initial February 2000 meeting of the Recreational Boating and Fishing Foundation's (RBFF) Education Task Force (TF2). The task force addressed the educational component of the Sport Fishing and Boating Partnership Council's Outreach and Communication Program Strategic Plan. The Education Task Force defined an ambitious agenda to its charge: Determine the best ways to "Educate people about how and where to fish and boat." To begin, the task force defined recreational boating, fishing and stewardship education as:

> "A complex process by which related skills, attitudes, knowledge, and behaviors are enhanced, developed and supported through a planned series of experiences.

The education task force also determined who the primary and secondary audiences are for the work of the task force:

- Primary Audiences
  1. Aquatic educators

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2. Education service providers – including their supervisors and administrators
3. Agency educators – formal and non-formal, including agricultural extension and parks and recreation departments
4. Education brokers – organizations responsible for providing education services.

- Secondary Audiences
  1. Task Force 4
  2. Point of sale – state license processing agencies
  3. Partners
  4. Wildlife law enforcement officers
  5. Non-governmental organizations that provide education programs
  6. Community-based organizations that provide education programs

Identifying what already exists was the next step identified by the Education Task Force. A request for proposals was issued to begin an inventory, database, and directory of existing educational programs, events, and curricula. The database is a directory for stakeholders where they can locate appropriate programs in their field of interest or in a particular geographical location. A contractor was selected and a website developed to build, maintain, and update the database. The website can be found at http://www.rbff-education.org.

The Education Task Force also included in its initial plans the need to determine which processes provide the best experiences for conveying knowledge, developing skills, and changing attitudes and behaviors from the following fields: community-based education, traditional education, experiential education, outcome-based education and evaluation, drug prevention education, watershed education, environmental ethics education, outdoor/adventure education, risk education, intervention, therapeutic recreation, sport sociology, leisure education, and non-formal education. To that end, they suggested that the RBFF issue a request for proposals to compile the best professional practices to provide guidance to boating, fishing, and stewardship educators.

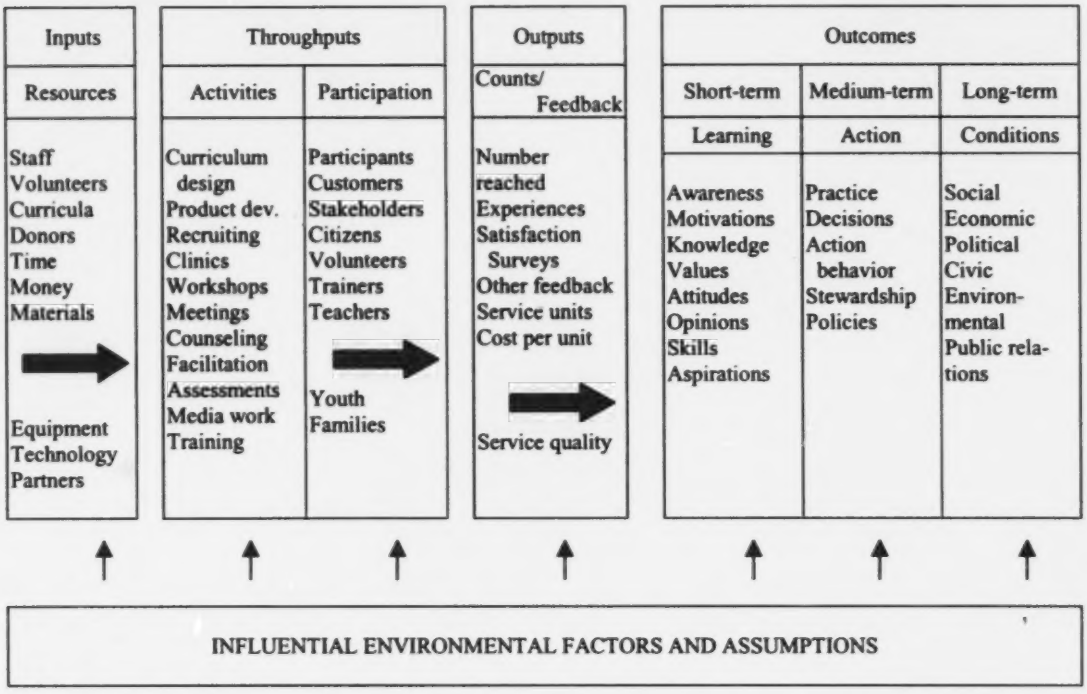
The Education Task Force also included in their overall strategy to "Educate people about how and where to fish and boat" a review of the relationship between boating and fishing participation and stewardship attitudes and behaviors. This literature review will provide the background for a future longitudinal research project that examines significant life experiences and their role in stewardship attitude and behavior development.

Within this context, an educational framework must be built that links aquatic education to the broader natural resource management picture. The objective is to enable educators—boating safety instructors, aquatic educators, outdoor skills instructors, environmental educators, classroom teachers, youth program volunteers, camp counselors, conservation educators, therapeutic recreation and adapted physical education specialists—to know and utilize the best practices for delivering outdoor education programs. Just as we base habitat and population management on research, educational practices also must be based on research and designed to provide the best possible means of attaining the skill, knowledge, attitude and behavioral goals we seek to reach. The Best Practices Project seeks to empower these same educators by offering guidelines as evidence to the decision-makers, administrators and public for whom they work that best practices do exist and that they as educators are accountable for using them.

Each year, millions of young people and adults are involved in fishing, boating and aquatic stewardship education programs. Staff and fiscal resources being devoted to these programs are receiving increased scrutiny as the effectiveness and value of these programs are questioned, particularly during difficult budget years. At issue are the benefits of boating, fishing, and stewardship education programs to state and federal fish, wildlife, and boating-related agencies and organizations. As budgets become more constrained, justification for each agency or organization program becomes more important. Biologists can point to improved water quality, miles of streams or acres of lakes rehabilitated, increased fish populations, and the larger size of fish as measures of biological benefits.

For educational programs, outputs like the number of children, adults or families participating in an educational program or event often serve as the only measures of program performance. Does participation in these programs contribute to agency revenues, image, or overall mission? Do educational programs result in more fishing licenses being sold? Do they result in a greater stewardship ethic and aquatic resource advocates among participants? Do they result in stronger support for the agency, its programs, and its budget? Administrators and program staff both recognize that there are many other goals associated with fishing, boating, and stewardship education programs, but there is little direct evidence that these goals and their related objectives are being achieved.

Figure 1: Conceptual Model for Program Development and Evaluation in Boating, Fishing and Aquatic Stewardship Education



Aquatic education goals can focus on short-term outcomes like facilitating change in awareness, knowledge, skills, or attitudes of participants. They can also address longer-term impacts such as changing individual conservation-related practices, decisions and behavior, or improving societal, economic or environmental conditions. Measuring the attainment of these goals is often difficult and may require expertise in sociological, psychological and educational research often unavailable in most agencies. However, to be accountable for their programs, education specialists need to be proactive and use appropriate evaluation tools and methods to measure intended outcomes and impacts. Furthermore, programs need to be designed based on the best information research and practical experience has to offer. This same information should be used to evaluate the quality of existing programs. Recommendations developed from research and practice that has been shown to be effective are often referred to as "best practices." Best practices can fill the needs of educators until more formal program evaluations can be conducted.

Conceptual Model for Best Practices

Applying best practices to aquatic and stewardship education programs requires an understanding of the outcomes desired from the program, appropriate methods for achieving the outcomes, resources necessary to apply the methods, and the environment and setting in which the program will occur. In essence, a systems approach can be applied to any program-planning endeavor to understand the linkages among components and to be able to evaluate the program (Rush and Ogborne 1991). The ability to link program activities to specific learning outcomes and then to longer-term impacts has led to what is called program theory (Rossi et al. 1999, Wholey 1987). Program theory provides the framework for describing how different factors (events, persons, functions and other elements of the program)

are related. Generally, these factors may be viewed as having cause-effect relationships (Funnell 1997, Julian et al. 1995). The elements and relationships for a given program can be depicted graphically in what has commonly been referred to as a program logic model. Besides serving as a communications device, program logic models can be used as heuristic devices to encourage a variety of questions concerning program design, implementation and evaluation (Rossi et al. 1999, Coffman 1999). For example, are program goals and objectives well defined and feasible? Are the individual components, activities and functions of the program well defined and sufficient? Is the change process articulated in the program theory plausible and achievable? Moreover, logic models can play an integral role in formative (ongoing during the program) and summative (conducted after completion) program evaluations. By understanding program components and their relationship to desired outcomes, each link in the process can be identified and evaluated.

A general conceptual model that can be applied to aquatic education is shown in Figure 1. There are four major components of the model, inputs, throughputs, outputs and outcomes. These arise from an existing situation or need and are influenced by the existing environment and any assumptions associated with the program. Environmental factors, which can influence the development, implementation and success of the initiative, include politics, climate, socio-economic conditions, institutional constraints, and other factors. The ability to identify, control or mitigate influential environmental factors, and the costs of doing so, are crucial to successful program development, implementation and evaluation.

The conceptual model shows the inputs or resources an agency or organization invests in order for a given initiative or program to occur. Inputs include staff, money, equipment, facilities, and other resources needed to carry out the program such as administrative approvals, budget authority, and agreements with cooperating agencies and organizations. The model links these resources to specific activities designed for target audiences. Activities and their participants are viewed as through-puts. The term "participants" is not limited to educational program learners but should include staff, administrators and others who are themselves learners in training programs and educational briefing sessions.

Once activities are completed, initial outputs are observed and measured. In the past, outputs often have been the sole measure of program effect. Programs or initiatives often focus only on how many people attended, on how many were reached or exposed to a message, or on how satisfied participants were with their experience. These measures are useful if the objectives of the program are to provide satisfying experiences for the participants or to convey information to the public. But, aquatic and stewardship education specifically, and environmental education generally, need to focus beyond outputs to short- and long-term outcomes to increase environmental awareness and knowledge, change attitudes and opinions, and establish an ethics-based valuing system that will later serve as a foundation for responsible behavior toward the environment in a variety of situations that one experiences. Achieving short-term or the lasting impacts of higher-level behavioral and societal changes are impossible to measure without carefully planned programs with commensurate rigorous evaluation activities.

Thus, logic models can provide a conceptual map for program design and evaluation purposes. In fully explicated program logic models, such as Dr. Tom Marcinkowski presents later in this document, it is possible to:

- Summarize the key elements of your program;
- Explain the rationale behind program activities;
- Clarify the relationships between activities and the intended outcomes of the program;
- Show the cause-and-effect relationships among activities and outcomes – that is, which activities are expected to lead to which outcomes;
- Help identify the critical questions for improving program design and evaluation; and
- Provide the opportunity for program stakeholders to discuss the program and agree upon its description.

When designing a new program or evaluating an existing program, this conceptual model and specific program logic models can be particularly helpful when using best practices for guidance.

A "best practice" can be defined as a program or practice that has been clearly defined, refined through repeated delivery, and supported by a substantial body of research.

These practices represent the best knowledge available for use under certain circumstances. Best practices are not immutable. They are recommendations based on what has been observed to be effective, but which may change given additional experience, evaluation, and research. Within natural resource management agencies,

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best educational practices should be recognized as applying science-based practices similar to those applied to fisheries, wildlife and natural resource management.

Identifying Best Practices

An approach to developing best practices is to consider what we want the learner to "be able to do, or be like" after being educated. Learners will have the physical skills necessary for successful participation in boating and fishing activities. They will have the intellectual skills and cognitive gateways necessary to sort and categorize information in terms of usefulness, quality, context, and relativity. They will have the ability to use information to build knowledge, and to understand the importance of using knowledge to support and provide a rationale for their attitudes and behavior. They will have developed the critical thinking, judgment and decision-making skills to be able to identify, use, and act appropriately on good information. They will have become ethically competent and fit. They will understand how to participate in both natural systems and government processes. They will know how to influence positive change and feel like they can make a difference with their informed participation, and through their actions.

Educational programs designed to change and encourage aquatic resource conservation and stewardship behavior also should consider the social context surrounding relevant environmental issues (Laska 1990). The literature on character, morals, ethics, and values education clearly establishes the importance of understanding the influence of social context on the success of educational efforts (Leming 1993a, 1993b; Matthews and Riley 1995). If not grounded within the particular community and cultural context of the learner, aquatic and environmental education will remain abstract, outside the scope of experience of the learner, inconsistent with cultural norms, and ultimately irrelevant (Berger and Neuhaus 1977, Hauerwas 1981, Sichel 1988).

Belonging to and identifying with a group is important for an individual's personal development. Researchers have identified social group and community as important variables in the development of ethics and values (Hauerwas 1981, Sichel 1988). Group and community members positively influence or actually initiate an individual into activities like fishing and boating, and can encourage or discourage participation and stewardship behaviors associated with aquatic resources (Dann 1998). Thus, aquatic education programs will be most effective in reaching behavioral goals if designed to incorporate parents, family, and neighborhood as part of the learning community (Matthews and Riley 1995).

Given the absence of research and evaluation literature to guide boating, fishing and aquatic stewardship education program development in the attainment of these lofty goals, we must turn to using best professional practices by drawing upon the diverse and rich research literature and practical experience from related fields. Identifying widely accepted principles and standards for education can provide the guidance needed until relevant directed evaluations have been conducted that indicate a different or more effective approach could be taken. These best practices can be used for planning, developing and implementing programs, providing ongoing professional development, conducting program evaluations, and identifying relevant research to further understand and improve the educational process.

The Best Practices Project

The Best Practices in Boating, Fishing and Stewardship Education Project focuses on identifying accepted principles and standards generally applicable to boating, fishing and stewardship education. Eleven experts with research and practical experience from diverse fields made recommendations for best educational practices for curricula, programs, and leadership that would affect change in aquatic resource and environmental knowledge, attitudes, and behaviors. Recommendations were to be supported with scientific research, peer recommendations, and practical experience. Each expert wrote a review paper distilling the best professional practices from his or her field that would likely result in accomplishing the goals of boating, fishing, and stewardship education programs. The experts also wrote a brief overview of appropriate evaluation methods for gauging the effectiveness of boating, fishing, and stewardship education programs. Gaps in the literature, pertaining to understanding the effectiveness of different educational approaches, were identified and prioritized as future research needs.

Experts were selected from fields such as:

- Boating education
- Aquatic education
- Environmental education
- Marine education
- Youth development
- Stewardship and environmental ethics education
- Adventure recreation education
- Minority education, and
- Outdoor education for people with disabilities.

Table 1: Guiding Principles for Boating, Fishing, and Aquatic Stewardship Education

Boating, Fishing, and Stewardship Education:

- Is learner-centered.
- Constitutes a continuous and lifelong process for individuals, families, and diverse social groups.
- Considers aquatic resources in their totality, including natural, built, technological, and social aspects (e.g., economics, politics, cultural-historical, moral, aesthetic).
- Provides participants with opportunities to engage in the valuing process (i.e., choosing, affirming, acting) as it relates to programs, program activities, and their own growth and development.
- Follows the principles of inclusion with regard to program participation by minorities and people with disabilities.
- Begins with goals and objectives that relate to appreciation and awareness, expand to include both knowledge and skills, and culminate in personal responsibility and responsible behavior.
- Builds upon local, state, and national partnerships to support the development, implementation, and evaluation of programs, as well as to support stewardship of the resource.
- Relies on a variety of systematic and continuous approaches to the assessment of participants and evaluation of programs so as to improve and eventually validate those programs.
- Supports, engages in, and makes use of the scientific, social, educational, and other forms of research that have a bearing on programs.
- Recognizes the critical role and the need to adequately support ongoing professional development for all personnel associated with these efforts and programs, including those suggested or implied in the above principles.

After completing their papers, the experts were joined by several professional boating, fishing and aquatic education administrators and practitioners in a workshop designed to reach consensus on basic principles and best practices derived from the collection of written papers and the group's collective practical experience. During the workshop, participants identified 10 general guiding principles for education programs. Additionally, the group recommended basic practices for each of four educational areas: 17 for program planning, development and implementation; 21 for professional development; 11 for program evaluation; and 6 for educational program research. Each of the principles and recommendations can be used in forming components of new programs or in evaluating existing programs.

Guiding Principles

Workshop participants identified Guiding Principles to provide the general framework and considerations necessary to successfully plan, develop, implement, and evaluate fishing, boating and stewardship education programs (Table 1). Chief among these principles is that education programs should be learner-centered and provide a lifelong process for individuals, families, and diverse social groups. Programs should meet the educational needs of the learners. Program designers should consider different learning capacities, cultural backgrounds, and special learning needs. And importantly, program designers should follow the principles of inclusion with regard to program participation by minorities and people with disabilities.

Boating, fishing and aquatic stewardship education programs need to encompass aquatic resources in their totality. Focusing on the natural component to the exclusion of the effects of development, technology, economics, politics, and other related factors reduces perspective on problems and ignores the complexity in solving environmental problems and managing natural resources.

The goals and objectives of educational initiatives should reflect a progression that begins with an appreciation and awareness of aquatic environments, expands to include the acquisition of knowledge and the development of skills for interacting with that environment, and culminates in ascription of personal responsibility to the care of aquatic resources and responsible behavior toward them. Within this context, participants should have the opportunity to engage in the valuing process by choosing information that is relevant to them, affirming it within their own belief and attitude structure, and using that structure to guide their actions toward the environment.

Agencies and organizations often fail challenges in effectively and efficiently developing and maintaining aquatic education programs over time. These challenges include changes in staffing and budget priorities. Thus, many successful programs are cooperative ventures with partnerships to support program development, implementation, and evaluation. This success is also predicated upon support for ongoing professional development for all personnel involved in all aspects of the program from administrators and trainers, to instructors and volunteers.

Finally, programs should rely on a variety of systematic and continuous approaches to participant assessment and program evaluation at all levels to improve quality and to eventually validate the program model. The conceptual model presented earlier and specific program logic models can provide the framework for conducting assessments of participant needs and capabilities. It can also identify the linkages among program elements that need evaluation to ensure that curricula are meeting outcome objectives. This implies that relevant scientific, social, educational, and other forms of research are used in the planning, design, implementation, and evaluation of aquatic education programs and that needed research is supported by the agency, administrators, and program personnel.

Recommendations for Best Practices

Workshop participants, comprised of both practitioners and academicians, used the papers prepared by the writers, their own personal knowledge of the literature, and their professional experience to organize recommendations for best practices into four categories: program development and implementation, professional development, program evaluation, and educational research. These categories emerged from the initial program framework articulated by the group that later evolved into the conceptual model in Figure 1. Other categories may emerge after further review and study by environmental professionals. Additional recommendations for each category are also likely to surface. The recommendations below should neither be viewed as exhaustive nor complete. After further review and application, some recommendations may need modification or additional clarification. As a result, this best practices work will need to continue into the future.

This is a beginning point from which professional experience, program evaluation, and educational research should continually challenge the reality of each recommendation. Best practices should evolve over time as we learn more about how our programs affect knowledge, skills, attitudes, and behaviors. Without commitment to formative and summative evaluations and without commitment to basic educational research to fill existing knowledge gaps and extend our current understanding, we will not develop an expanded scientific basis to improve and extend practices that lead to efficient and effective educational programs.

Each recommendation is presented within the context of characteristics of effective programs. Programs that embody these characteristics should be effective and, thus, capable of meeting their objectives.

Program Development and Implementation

Best practice recommendations for program development and implementation (Table 2) focus on learner, curriculum, and agency needs. Programs should be accessible to all learners and employ adaptive technology and strategies for inclusion. Curricula need to be developmentally appropriate and designers should consider age, gender, ethnicity, and socioeconomic status. Programs should equip learners with skills to participate more competently in fishing and boating activities. They should equip them with skills to analyze and evaluate information and issues and to develop the personal and civic responsibility necessary to become active resource stewards.

Curriculum development should begin with a needs assessment; during this step, programmers should profile program participant characteristics and also identify the needs of the agency and local community as well. Coupled with a needs assessment should be an inventory of administrative, educational, community, and environmental resources that can be used to shape individual programs. Programs should utilize teaching methods that are appropriate for program goals and objectives, and be sensitive to participant needs. Information should be interdisciplinary and accurate, and presented in a fair and balanced manner that includes all points of view on controversial issues. Materials used should be evaluated for factual accuracy and balance as well. Programs should be learner-centered and allow for active and experiential learning opportunities.

There should be firm agency commitment behind each program. This means that the program is relevant to agency goals and objectives and that adequate and sustainable resources are available. It means that the agency is willing to involve stakeholders in the

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Table 2: Best Practices for Program Development and Implementation

Effective Programs:

- Are relevant to the mission of the agency or organization sponsoring the program, the educational objectives of the audience, and everyday life of the learner.
- Use some form of needs assessment to establish a basis for and to help shape individual programs. Assessments should include needs of the agency, community, and participants.
- Involve stakeholders at all levels of their development.
- Empower learners with skills to address environmental issues and with a sense of personal and civic responsibility.
- Present accurate and balanced information incorporating multiple perspectives using an interdisciplinary approach.
- Are accessible to persons with disabilities and incorporate adaptive technology, support staff, and services to meet the needs of all participants in an inclusive manner.
- Receive adequate resources, staffing, and are supported through appropriate resources and staff so that they become sustainable over time.
- Are instructionally sound, utilizing learner-centered and experiential instructional approaches to provide opportunities for collaborative learning and the development of critical thinking skills.
- Are developmentally appropriate, using multiple methods to enhance learning opportunities for diverse learning styles.
- Provide educational opportunities that are frequent and sustained over time.
- Use an interdisciplinary approach to develop skills, formulate concepts, and examine issues.
- Aligns curriculum with national and state educational standards, when appropriate.
- Use curricular materials and other print and electronic resources that present accurate information, and when addressing controversial topics, expose participants to different perspectives in a fair and balanced manner.
- Inventory and utilize a variety of educational resources and environments, including community resources (e.g., speakers, offices), and lab and field sites (e.g., hatcheries, marinas, ponds and lakes), in a sustainable manner.
- Are planned and carried out in a manner that clearly addresses safety and other regulations, and reduces real risks to everyone involved by utilizing professional safety and risk management techniques.
- Rely on experienced, well informed, prepared, and ethical staff to develop, implement, and evaluate programs.
- Make use of a variety of teaching and learning methods that are appropriate for a program's goals, objectives and subject matter, and are sensitive to participant age, developmental level, and background.

program and develop partnerships with interested agencies, groups and individuals, where appropriate. It also connotes that well-trained and prepared staff and volunteers are available and involved. Inherent in agency commitment is a genuine concern for participant and staff safety with regard to the program, facilities, and related services and that each aspect of the program has been reviewed and concerns addressed.

Professional Development

One of the key ingredients to any successful program is having highly qualified and well-trained staff and/or volunteers to provide leadership and work effectively with learners. Thus, best practices for program staff (Table 3) revolve around ongoing professional development and support, which are critical to sustaining effective programs over time. The cornerstone of professional development is recruitment of qualified and motivated program personnel. Whether hired staff or volunteer, knowledgeable, committed, and ethical individuals capable of working with diverse groups are important keys to success. Everyone associated with the program must have a clear understanding of agency goals and objectives and how they relate to agency educational programs.

Table 3: Best Practices for Professional Development

Effective professional development:

- Clearly presents the agency's or organization's mission and goals.
- Inspires active, ongoing, lifelong learning by professional educators.
- Addresses diverse learning styles by presenting material in a variety of formats and experiences, and incorporates active learning.
- Values diversity and relates to audiences consisting of diverse social, cultural, and economic groups.
- Includes opportunities for youth leadership development as well as for adults.
- Includes aquatic resource stewardship as an outcome and/or longer-term impact.
- Follows a validated process for workshop training to establish consistency, when appropriate.
- Offers tiers of training to provide for continuing education using a "roll out" process for increasing learner knowledge and competency over time.
- Includes presentation of effective teaching methods and ways to foster learning.
- Presents models of good instructional and assessment practices.
- Provides opportunities for learning to continue over an extended period through the innovative use of the Internet, listservers, newsletters and networking.
- Provides mechanisms for updating existing information and disseminating it to educators and administrators.
- Uses attractive and appropriate training materials, and provide hands-on exposure to materials to be used in the classroom.
- Provides appropriate models of program evaluation.
- Considers audience motivations for participating in professional development (e.g., mandatory or voluntary).
- Includes formative, summative and long-term evaluation of the trainer, the program and the trainee.
- Includes pre-service (basic training) and in-service (in-depth) training modules and avoids brief one-shot training sessions.
- Recruits instructors with experience and knowledge in the subject area.
- Incorporates educational theory into training curriculum.
- Screens instructors, with criminal background checks, and interviews them for potential, motivation, commitment, ethical behavior, knowledge, and the ability to work diverse groups.
- Provide opportunities for mentoring by experienced instructors and staff.

Training should include basic pre-service orientation and exposure to program materials, processes, and mechanics. There should be additional in-service training where instructors can receive in-depth exposure to specific program elements or to new curriculum areas that will be integrated into the program in the future. Opportunities for continuing education should be encouraged, facilitated, and supported. This support includes opportunities to review and update program materials. Such reviews should be part of a validated process for training programs based on evaluations of trainer, program, and trainee. This will ensure program integrity across instructors and that desired outcomes are being achieved.

Professional development programs should be built on sound instructional models that recognize the diversity inherent in any group of learners. They should utilize multiple methods for presenting information and should incorporate active learning opportunities. These programs should use attractive and appropriate training materials and provide hands-on exposure to program materials. Training program design should reflect tiers of learning appropriate for the beginning teacher or volunteer as well as the master teacher. Training programs should also include opportunities for youth leadership development and mentoring at all age and experience levels. Above all, professional development should help inspire active, lifelong learning by professional educators and by volunteers, as well.

Program Evaluation

One of the most neglected components of educational programs is evaluation. Terms such as essential, valuable and mandatory have been used to describe the importance of evaluation, however, most evaluative efforts rarely report more than program outputs such as the number of participants, participant satisfaction, or

Table 4: Best Practices for Program Evaluation

Effective program evaluation:

- Is envisioned and undertaken as a systematic and ongoing process that begins when a program is being planned or developed, and that included both formative and summative evaluations.
- Receives both administrative support and budgeted allocations as part of program costs.
- Is utilized as a learning tool to support program reflection, decision-making, and improvement.
- Includes pre-assessments of learners and assessments of learning outcomes that are based on program goals and objectives.
- Helps identify program outputs, such as number of participants and participation feedback.
- Is used to help align program inputs (e.g., materials, resources) and processes (e.g., activities, services) with program outcomes.
- Explores and investigates the program's long-term benefits and impacts.
- Encourages the use of assessment methods that include, when appropriate, informal methods (e.g., Q&A, observations), traditional methods (e.g., quizzes, tests), and alternative/authentic methods (e.g., rubrics for performance tasks and projects, portfolios).
- Makes use of curricular materials that have been carefully reviewed against national criteria, or will use these criteria to select, develop and/or revise materials.
- Makes use of evaluators and evaluation methods that involve and empower program staff.
- Allows program staff (i.e., administrators, coordinators, and instructors) to take advantage of professional development opportunities in the areas of assessment and evaluation, so that staff have greater capacity to carry out and use results from sound program evaluations.

information exposure. Evaluations of short- and long-term impacts of aquatic education have been relatively rare, as have evaluations of the effects of different curricula. Therefore, best practice recommendations for program evaluation (Table 4) are presented within the context of increasing agency and organizational capacity to plan, implement, and use educational program evaluations.

> Program evaluation should be envisioned and undertaken as a systematic and ongoing process that begins when a program is being planned or developed, and that includes both formative and summative components. It should receive both administrative and budgetary support which are included as part of program costs.

Evaluation can be used to align program inputs and processes with short- and longer-term program outcomes and benefits. It can range from pre-assessments of learners to assessments of learning and behavioral outcomes identified in program goals and objectives. Further, an integrated evaluation program makes use of curricular materials that have been carefully reviewed against national criteria and uses these criteria to select and develop new materials, and revise existing materials. A mixture of evaluation methods should be considered with the most appropriate methods selected for each aspect of the program being evaluated. These methods could utilize informal techniques such as question-and-answer sessions, and direct observation of learner competencies and behavior. Formal methods such as quizzes, tests, and surveys are also appropriate in some situations. Finally, alternative/authentic methods that evaluate program outcomes in a more non-traditional manner should be considered. For example, rubrics for performance tasks, projects, and portfolios could be developed to assess learner achievement

One of the limitations of educational programs is the lack of trained staff that can plan and carry out evaluations. Thus, allowing program staff (including administrators, coordinators and instructors) to take advantage of professional development opportunities in the areas of assessment and evaluation builds greater capacity for staff to become directly involved in undertaking these activities and applying the results from sound program evaluations. Agencies lacking this capability can build partnerships with institutions, agencies and consultants with experience in conducting formal evaluations.

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Table 5: Best Practices for Research

Effective research:

- Allows program staff to explore and recognize both the value of and the need for research that is relevant to their program.
- Is organized and communicated in ways that provide opportunities for program staff to become aware of and generally familiar with collections, reviews, and summaries and syntheses of research relevant to their program.
- Is organized and communicated in ways that permit program staff to incorporate major research findings into the design, development, implementation, and evaluation of a program.
- Is organized and communicated in ways that help program staff become aware of, explore, and share both apparent gaps in existing research and additional research needs.
- Allows program staff to take advantage of professional development opportunities that enhance their abilities to understand the implications of research for their program and strategies for making use of that research.
- Allows program staff to take advantage of professional development opportunities that enhance their research skills and thereby strengthen their capacity to become meaningfully involved in the research process (e.g., as in action research).

Educational Research

There is an acute need for aquatic education-related research. The authors of the papers in this report uncovered only a handful of articles examining the efficacy of aquatic education programs. Our ability to answer the question, "Are we having an impact with our education programs?" largely is unanswered. Drawing from the broader environmental education literature has provided some guidance in developing the best practices outlined here. However, differences in instructional methods, curricula, materials, settings, and participant/learners make generalizations to aquatic education programs tenuous. Scientific examination of the relationships among these variables with desired outcomes such as changes in environmental knowledge, attitudes, values, action skills, stewardship behavior, and other individual and social outcomes is not well understood. Further, we need to link research on the social and psychological characteristics of recreational anglers and boaters to educational research.

One of the major reasons for the absence of this type of research has been a lack of capacity by sponsoring agencies and organizations to conduct educational research. Salience or value of aquatic or environmental education research notwithstanding, few fish and wildlife agencies or conservation-related organizations have the in-house capability for identifying research needs, designing appropriate studies, and carrying out the project. As a result of this situation, the best practice recommendations for educational research (Table 5) focus on capacity building within the organization.

This does not mean aquatic education researchers need to be hired. It does mean that program staff should have the capability to recognize and communicate both the value of and the need for research that is relevant to their programs. This can only be accomplished through professional development opportunities that enhance staff research skills. This in turn will strengthen their capacity to become meaningfully involved in the research process and by building relationships with professional evaluators. Commensurate with this recognition is the availability of opportunities for program staff to become aware of and familiar with collections, reviews, summaries, syntheses, and applications of research relevant to their programs. Awareness and research experience will allow program staff to incorporate major research findings into the design, development, implementation, and evaluation of their programs. It will also help them to identify gaps in existing research and additional research needs.

Conclusion

It is beyond the scope of this project to recommend specific strategies, curricula, materials, and leadership techniques that result in changes in specific outcomes. As many of the authors in the following papers point out, achieving desired outcomes is influenced by audience characteristics, learning capabilities, previous knowledge and experience, and other variables unique to local educational programs. An educational pro-

gram that is effective in changing environmental attitudes or developing environmental action skills with one type of group in one location may or may not be effective with different groups or in different locations. Our understanding of the generalizability of programs to groups and settings is extremely limited. While the principles and recommendations made above can help guide us in the direction of achieving effective and efficient programs, we still need to know which programs are effective in reaching their goals and objectives and the conditions that led to success. Fishing, boating and aquatic stewardship education programs need to be based on theory, research and practice.

Summary of Expert Papers

The 11 papers written for this project cut across a variety of disciplines and provide differing perspectives on boating, fishing, and aquatic stewardship education. The purpose of these papers was to present research-based information from diverse areas that would yield best practices when considered altogether by participants attending the workshop. The following is a brief overview of each paper.

Bill Siemer leads off with a discussion of aquatic resource stewardship education and the characteristics of aquatic stewardship education programs that lead to successful changes in environmentally responsible behavior. Changes in both individual- and community-level factors are needed to encourage and sustain stewardship commitment over time. Aquatic education programs that include some type of recreational fishing activity are more effective at establishing responsible environmental behaviors than those that do not. He also advocates that evaluations of educational programs need to be routinely included in program planning.

Julie Athman and Martha Monroe point out that environmental literacy depends on personal commitment and motivation to help ensure environmental quality and quality of life. They point out that the goal of environmental education is to instill in learners knowledge about the environment, positive attitudes toward the environment, competency in citizen action, and a sense of empowerment. Considerable research is reviewed that underscores the importance of these principles and identifies the means to achieve them.

Roseanne Fortner discusses how aquatic stewardship education can be infused with classroom science, math and social studies curricula. She reminds us that ethics and stewardship are societal values that are not ascribed to by everyone and thus can become a source of conflict within a community. She notes that adoption of aquatic and environmental education into school classrooms is highly dependent upon informed and trained teachers. Getting aquatic resource education into the schools can be accomplished by meeting teachers needs for specific topics, having excellent curriculum materials, and delivering them with a strong program of teacher education.

Michaela Zint informs us that although we know much about promoting change in environmental knowledge, skills, attitudes, behaviors, and other factors, this knowledge has not necessarily been applied to aquatic stewardship education. Further, while excellent programs and materials exist, most educators are unaware of them or do not have the necessary pre- and in-service training to use them. She suggests that behavioral changes are possible, but that we are unlikely to achieve them unless we build on past program evaluations and experience.

Alan Graefe provides a broad perspective on boater safety education. While the topic is not directly tied to aquatic stewardship, the principles for disseminating information, developing skills, and getting people to act on what they have learned provides insight into how to achieve desired changes in behavior. He also points out that best practices in boater education are based on a consensus of professional judgment or frequency of use. Like aquatic stewardship education, much more research is needed to understand the effectiveness of various educational approaches.

Myron Floyd helps us understand how to overcome marginality, subcultural, assimilation, and interpersonal and institutional discrimination factors to reach out to diverse audiences. By being vigilant and seeking input from diverse audiences at all phases of the program planning and service delivery, most problems can be identified before programs are implemented. He also suggests that input from periodic focus group sessions or establishing formal information channels with advisory groups can be effective ways of increasing diversity in all programs.

Tom Marcinkowski uses a case study of an issue and action instruction program to focus on the development and application of investigation and evaluation skills to environmental problems and issues. He reviews the research base used to develop various components of the issue and action instruction program and to further refine and extend the program. To be effective, teachers in these programs need to assume the role of guide and facilitator rather than content provider. He advocates the use of a program logic model to organize the program and identify important linkages for evaluation.

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Marni Goldenberg uses her experience in the outdoor adventure education field to focus on the curriculum, program and leadership issues involved in changing skills, knowledge, attitudes, and behaviors. She identifies the basic needs in outdoor education, the curricula that have been developed to meet these needs, and the research supporting program design and leadership styles. Ongoing program evaluations are deemed essential if organizations providing outdoor adventure education programs are to meet standards for ethics of care for participants and the environment, leadership quality, and matching participant needs with organizational goals and objectives.

Jo-Ellen Ross brings a much need perspective to including people with disabilities in boating, fishing, and aquatic stewardship education programs. Research on people with disabilities shows they have the same motivations for participating in outdoor activities as other segments of the population. Her discussion of legislation and regulations is informative and helps us understand the legal requirements for access to programs, facilities, and services by people with disabilities to ensure an inclusive environment. She points out that using appropriate terminology also conveys a sense of inclusion for programs and facilities. By using assistive devices and some additional planning, education programs can become inclusive and provide benefits to all segments of the population.

Kathleen Vos summarizes the 4-H Youth Development Program to identify effective strategies for curriculum and leadership development, and program implementation. She advocates moving from a youth development model to a community – youth framework to harness the energy, creativity, and dedication of both youth and adults to create community change. She believes that by integrating research and practice on youth – adult partnerships, experiential learning strategies and the community – youth development movement will help develop a sustainable learning community that brings about change in how communities deal with issues related to boating, fishing and environmental stewardship.

Finally, **Janice McDonnell** builds on her educational experiences with the Jacques Cousteau National Estuarine Research Reserve to highlight innovative educational programs that can be used as a springboard to encourage educators and their students to use the marine environment as a focal point while developing basic skills in reading, writing, math, problem-solving, and critical thinking. The use of model science programs, the development of collaborative school projects, and Internet connections can make science education exciting and relevant to current environmental policy issues. She advocates educators short-circuiting the arduous rote memorization exercises commonly associated with the study of science, and replace it with first-hand experiences found within the scientific and cultural resources of the state or region.

References

Berger, P.L. and R.J. Neuhaus. 1977. To empower people: The role of mediating structures in public policy. American Enterprise Institute for Public Policy Research, Washington, D.C.

Coffman, J. 1999. Learning From Logic Models: An Example of a Family/School Partnership Program. Cambridge, MA: Harvard Family Research Project.

Dann, S.L. 1998. Intervention programming to enhance fishing recruitment and retention: A literature review with implications for the Hooked on Fishing - Not on Drugs Program. Department of Fisheries and Wildlife, Michigan State University, East Lansing.

Funnell, S. 1997. Program logic: An adaptable tool for designing and evaluating programs. Evaluation News and Comments: The Magazine of the Australasian Evaluation Society 691):5-17.

Hauerwas, S. 1981. A Community of Character: Toward a Constructive Christian Ethic. University of Notre Dame Press, South Bend, IN.

Julian, D.A., A. Jones, and D. Deyo. 1995. Open systems evaluation and the logic model: Program planning and evaluation tools. Evaluation and Program Planning 18(4):333-341.

Laska, S. 1990. Designing effective educational programs: The attitudinal basis of marine littering. In R. S. Shomura and M. L. Godfrey (eds.) Proceedings of the 2nd International Conference on Marine Debris. U.S. Department of Commerce, NOAA-TM-NMFS-SWFSC-154, Honolulu, Hawaii.

Lazear, D. 1992. Teaching for Multiple Intelligences. Blumington, IN: Phi Delta Kappan Educational Foundation.

Leeming, F.C., W.O. Dwyer, B.E. Porter, and M.K. Cobern. 1993. Outcome research in environmental education: A critical review. Journal of Environmental Education 24(4):8-21.

Leming, J.S. 1993a. Character Education: Lessons From the Past, Models for the Future. Institute for Global Ethics. Camden, Maine.

Matthews, B.E. and C.E. Riley. 1995. Teaching and evaluating outdoor ethics education programs. Education Outreach Department, National Wildlife Federation. Vienna, Va. 110pp.

Rush, B. and A. Ogborne. 1991. Program logic models: Explaining their role and structure for program planning and evaluation. The Canadian Journal of Program Evaluation 6(2):23-40.

Rossi, P., H. Freeman, and M. Lipsey. 1999. Evaluation: A Systematic Approach. Thousand Oaks, CA: Sage Publications.

Sichel, B.A. 1988. Moral Education: Character, Community, and Ideals. Temple University Press, Philadelphia, PA.

Wholey, J.S. 1987. Evaluability assessment: Developing program theory. In, L. Bickman (ed.), Using Program Theory in Evaluation: New Directions for Program Evaluation. San Francisco: Jossey-Bass.